The Floridan Aquifer System

Fundamentals, Monitoring, and Conceptual Plan to Conduct Further Evaluation

Presented by

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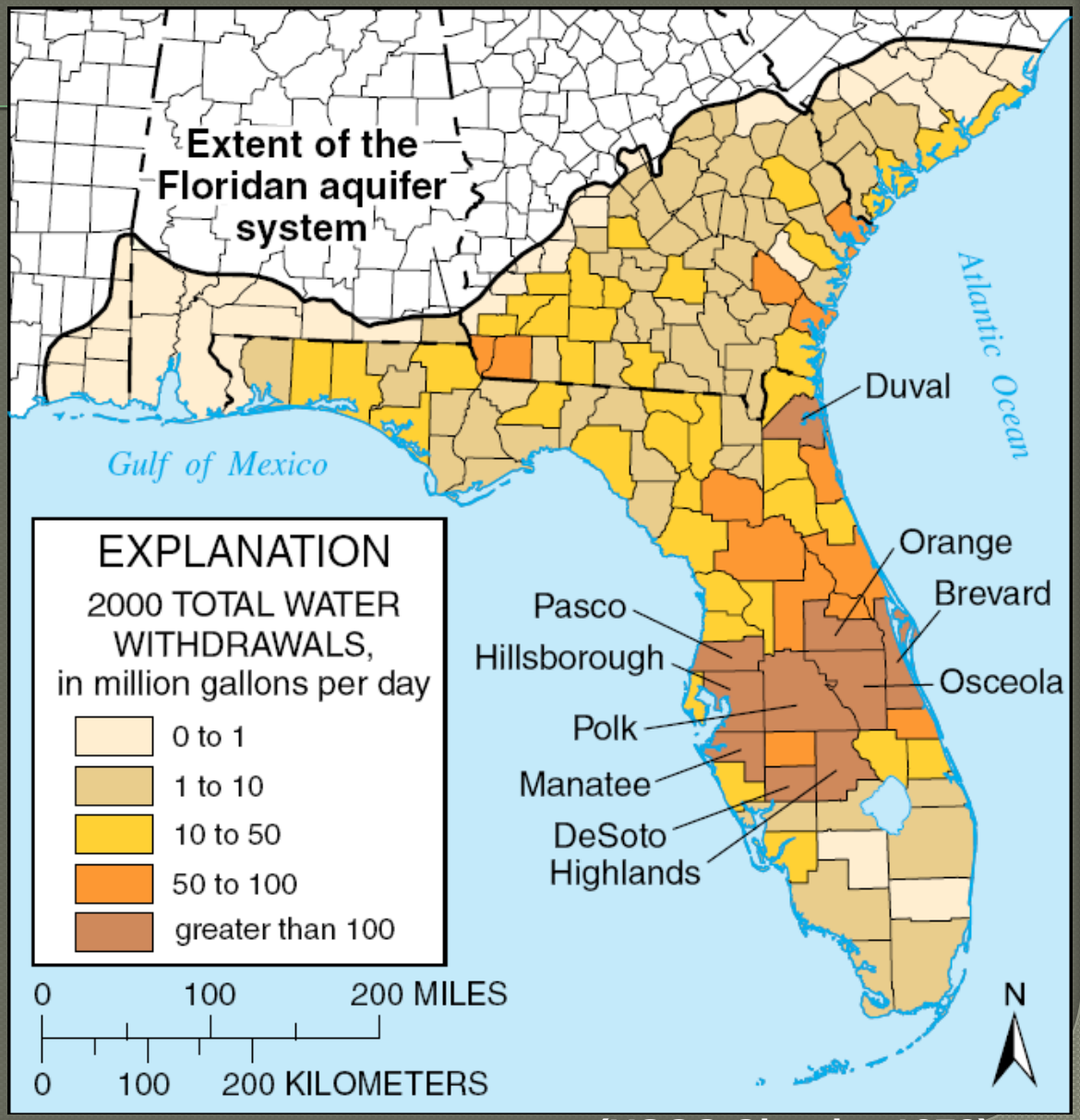
Floridan Aquifer Demands (2000)

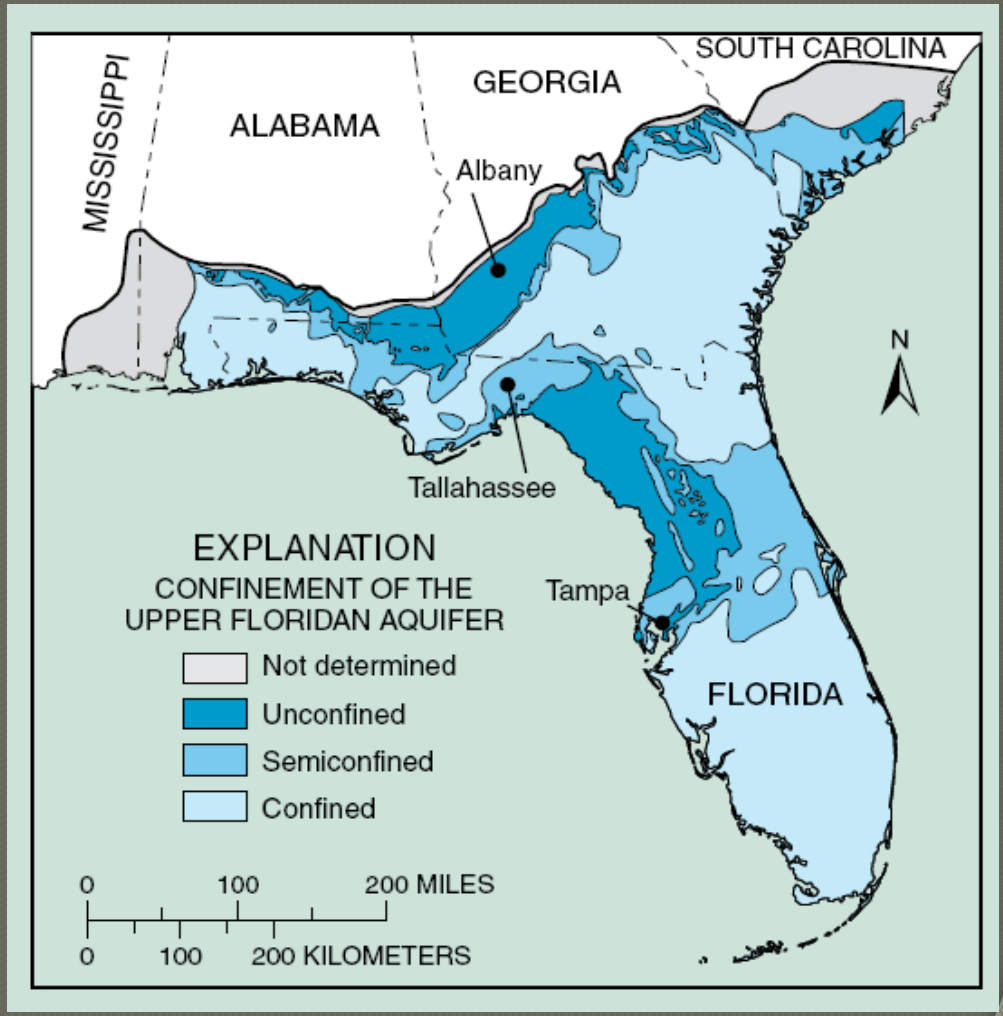
the Floridan Aquifer System supports almost 10 million people as their primary source of water … (Marella and Berndt, 2005)



(USGS Circular 1278)

Geographic Differences of Floridan Aquifer System

- Recharge Area in Central Florida
- Confined Aquifer in South Florida
  - (-) less water released from storage, greater drawdowns
  - (+) less problem with impacts to wetlands or surface-water bodies

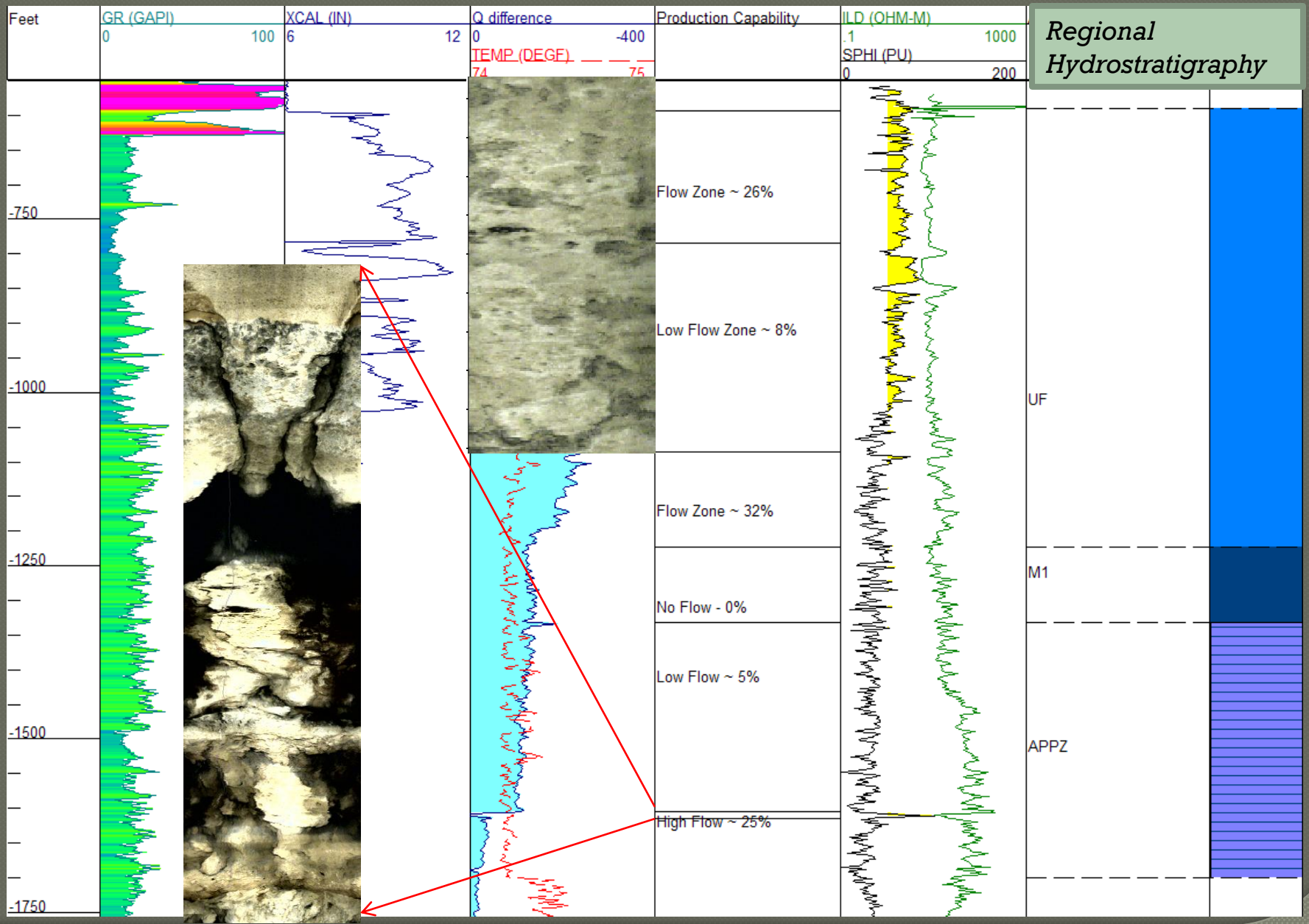


(USGS Circular 1278)

Hydrostratigraphic Chart in SFWMD

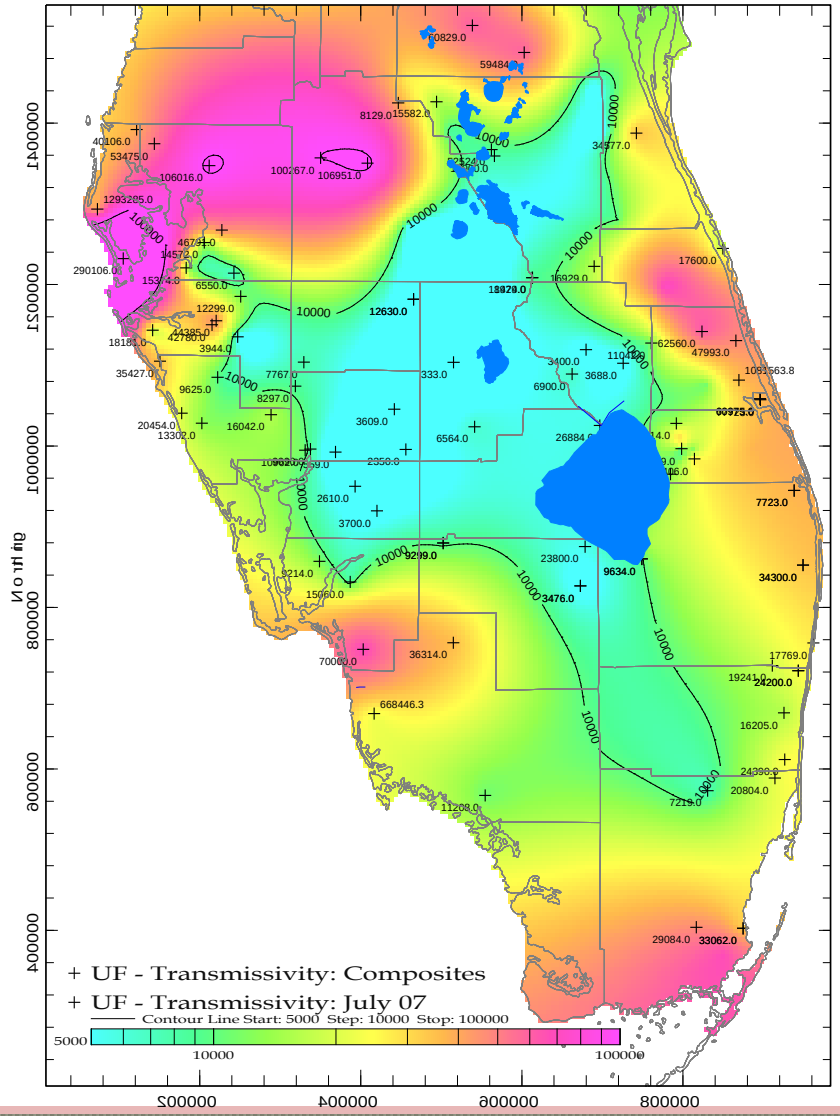
Geologic unit		Lithology	Hydrogeologic unit		Approximate thickness (feet)
Undifferentiated and various Pleistocene-aged formations		Quartz sand; silt; clay; shell; limestone; sandy shelly limestone	SURFICIAL AQUIFER SYSTEM	WATER-TABLE / BISCAYNE AQUIFER	20-400
TAMIAMI FORMATION		Silt; sandy clay; sandy, shelly limestone; calcareous sand-stone; and quartz sand		CONFINING BEDS / LOWER TAMIAMI AQUIFER	
HAWTHORN GROUP	PEACE RIVER FORMATION	Interbedded sand, silt, gravel, clay, carbonate, and phosphatic sand	INTERMEDIATE AQUIFER SYSTEM OR CONFINING UNIT	CONFINING UNIT / SANDSTONE AQUIFER OR PZ1(?) / CONFINING UNIT	0-900
	ARCADIA FORMATION	Sandy micritic limestone; marlstone; shell beds; dolomite; phosphatic sand and carbonate; sand; silt; and clay		MID-HAWTHORN AQUIFER OR PZ2 / CONFINING UNIT	
	BASAL HAWTHORN UNIT				
SUWANNEE LIMESTONE		Fossiliferous, calcarenitic limestone	FLORIDAN AQUIFER SYSTEM	LOWER HAWTHORN PRODUCING ZONE / PZ3	0-300
				UPPER FLORIDAN AQUIFER (UF)	100-800
OCALA LIMESTONE		Chalky to fossiliferous, mud-rich to calcarenitic limestone			
AVON PARK FORMATION		Fine-grained, micritic to fossiliferous limestone; dolomitic limestone; and dolostone. Also contains in the lower part anhydrite/ gypsum as bedded deposits, or more commonly as pore filling material. Glauconitic limestone near top of Oldsmar Formation in some areas		MIDDLE CONFINING UNIT (MC1) / APPZ	500-1,500 / 0-600
				MIDDLE CONFINING UNIT (MC2)	
?—?—? OLDSMAR FORMATION				LOWER FLORIDAN AQUIFER / L1 / BZ	0-1,800 / 0-700
CEDAR KEYS FORMATION		Dolomite and dolomitic limestone			
		Massive anhydrite beds		SUB-FLORIDAN CONFINING UNIT	1,200?

Vertical Differences of Floridan Aquifer System:

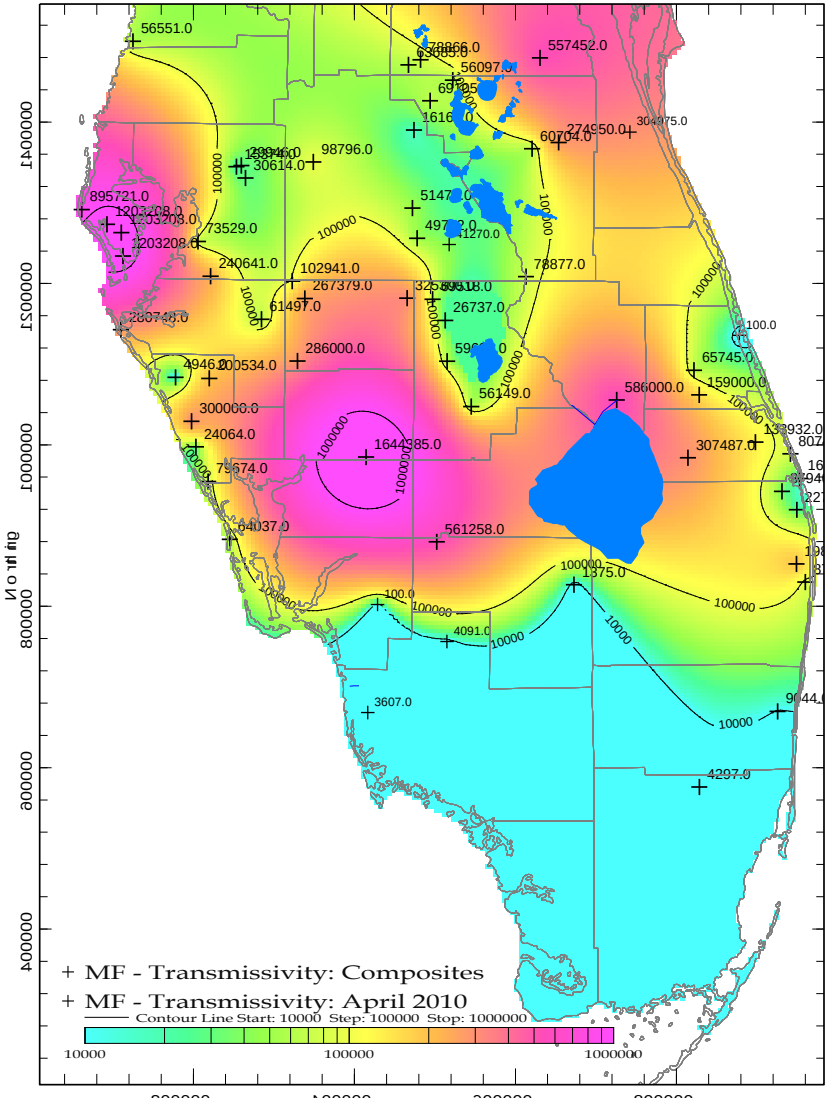


Geographic Differences in Transmissivity within the FAS

Uppermost Producing Zone

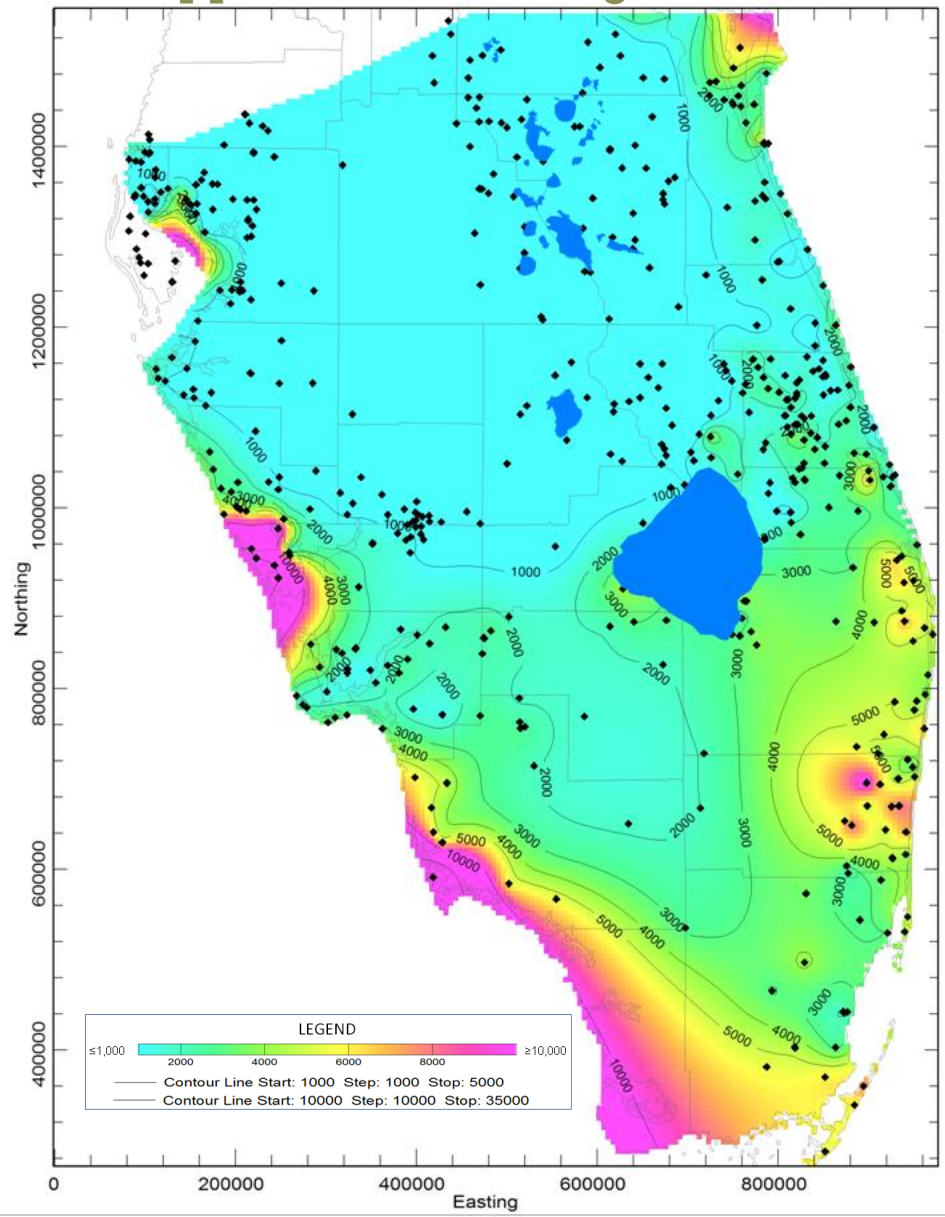


Avon Park Producing Zone

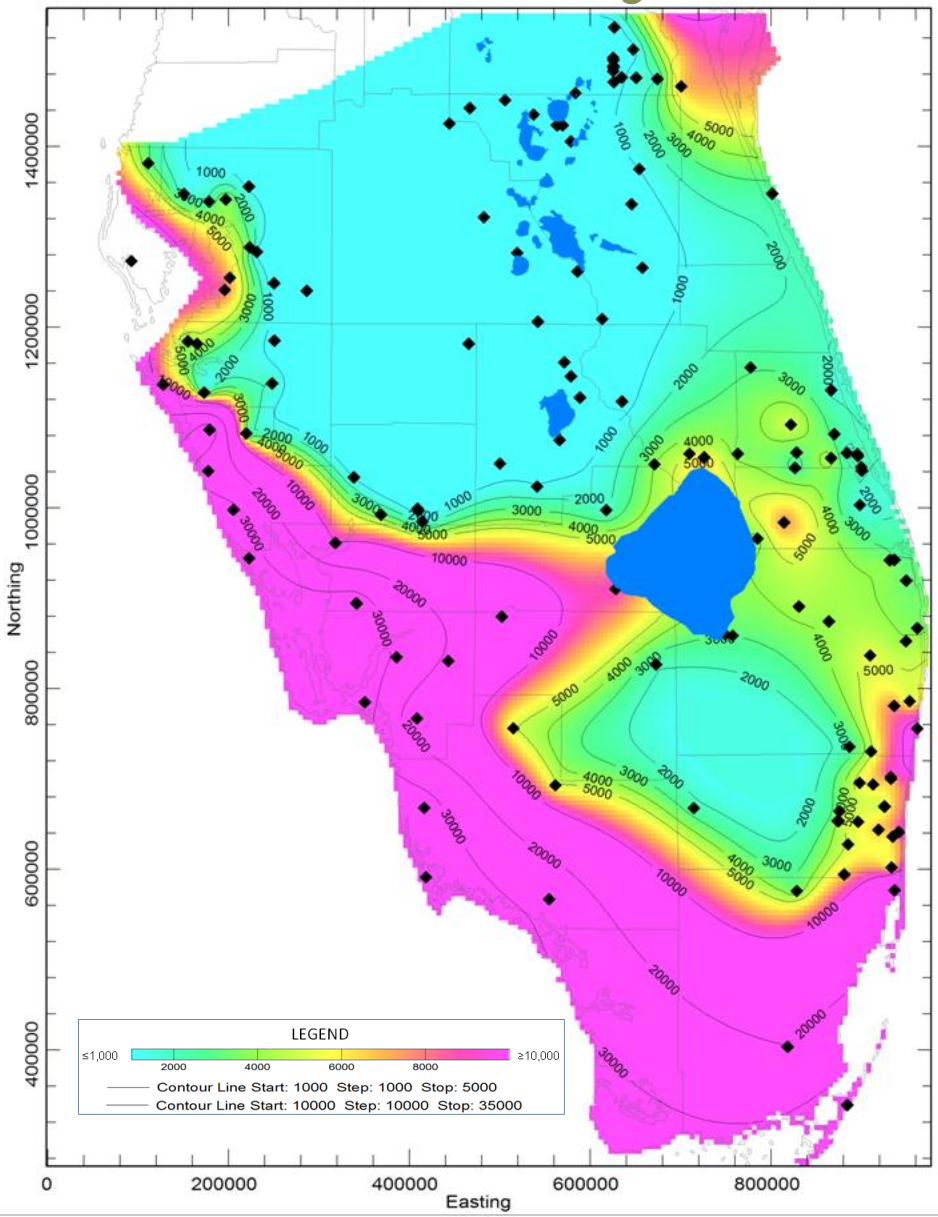


Geographic Differences in Salinity within the FAS

Uppermost Producing Zone

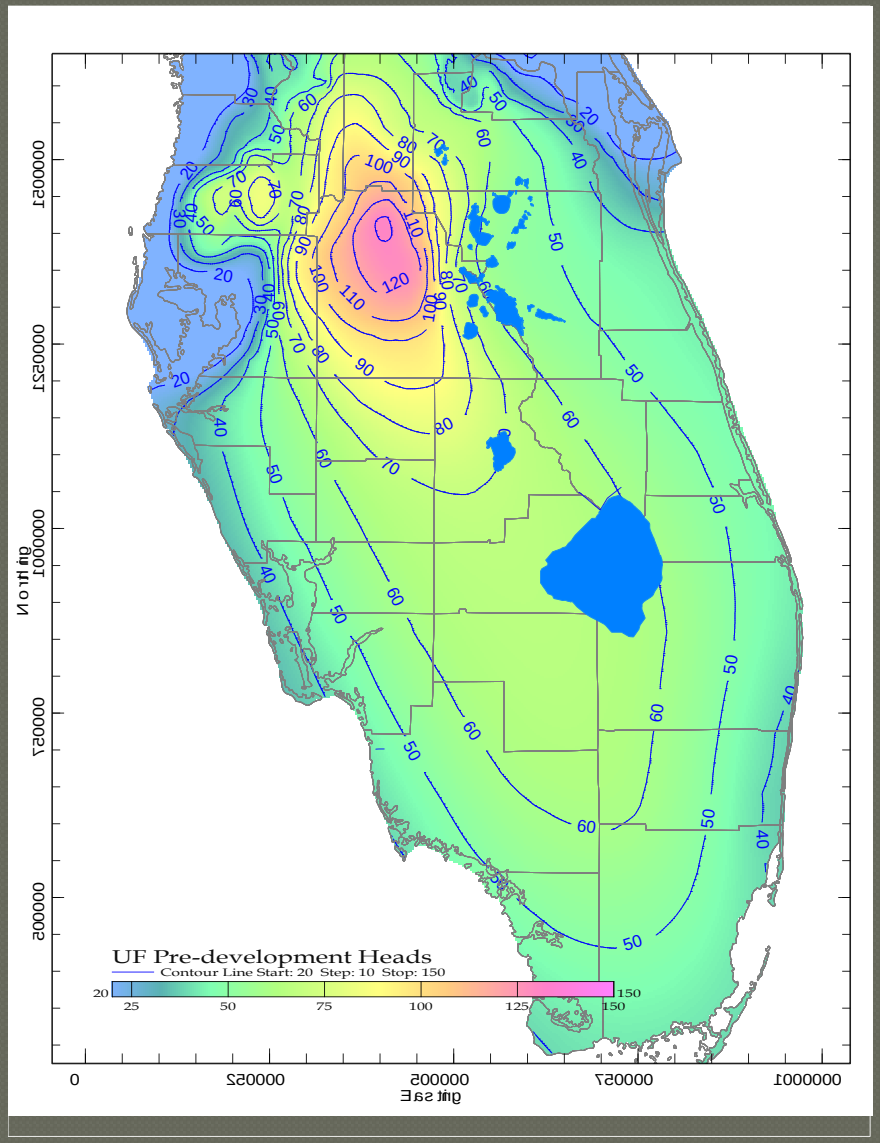


Avon Park Producing Zone

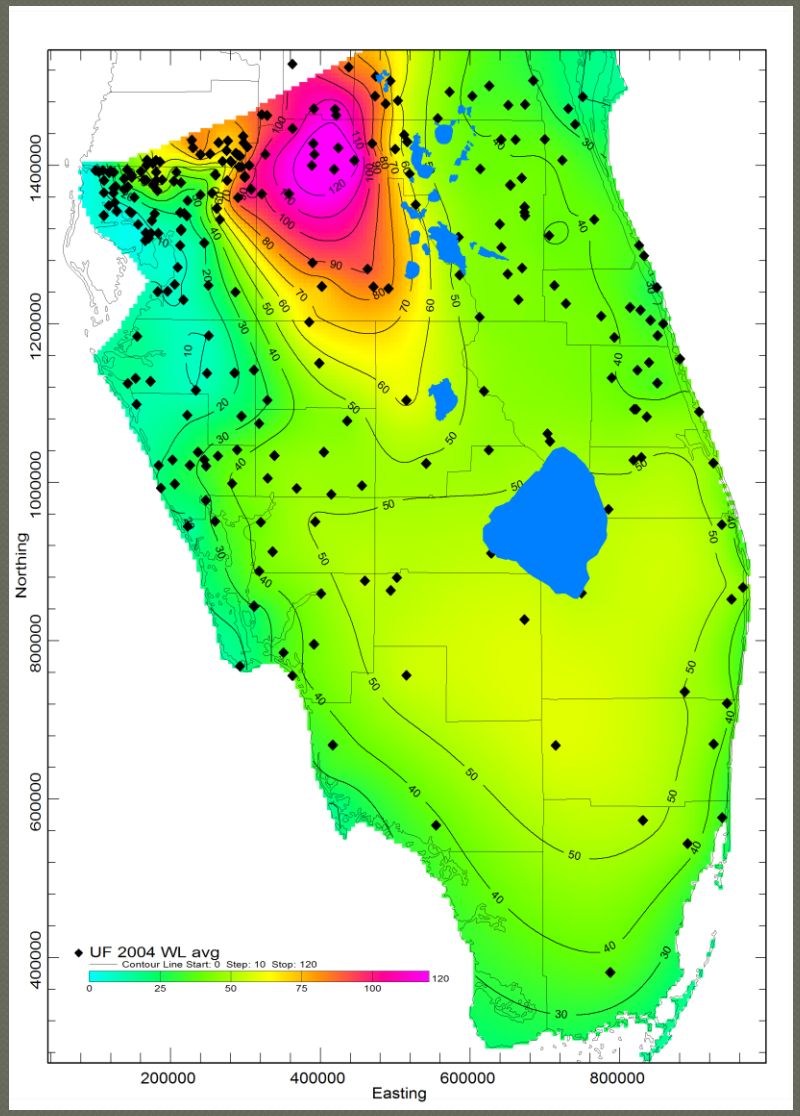


Changing Water-levels due to Long-term Withdrawals

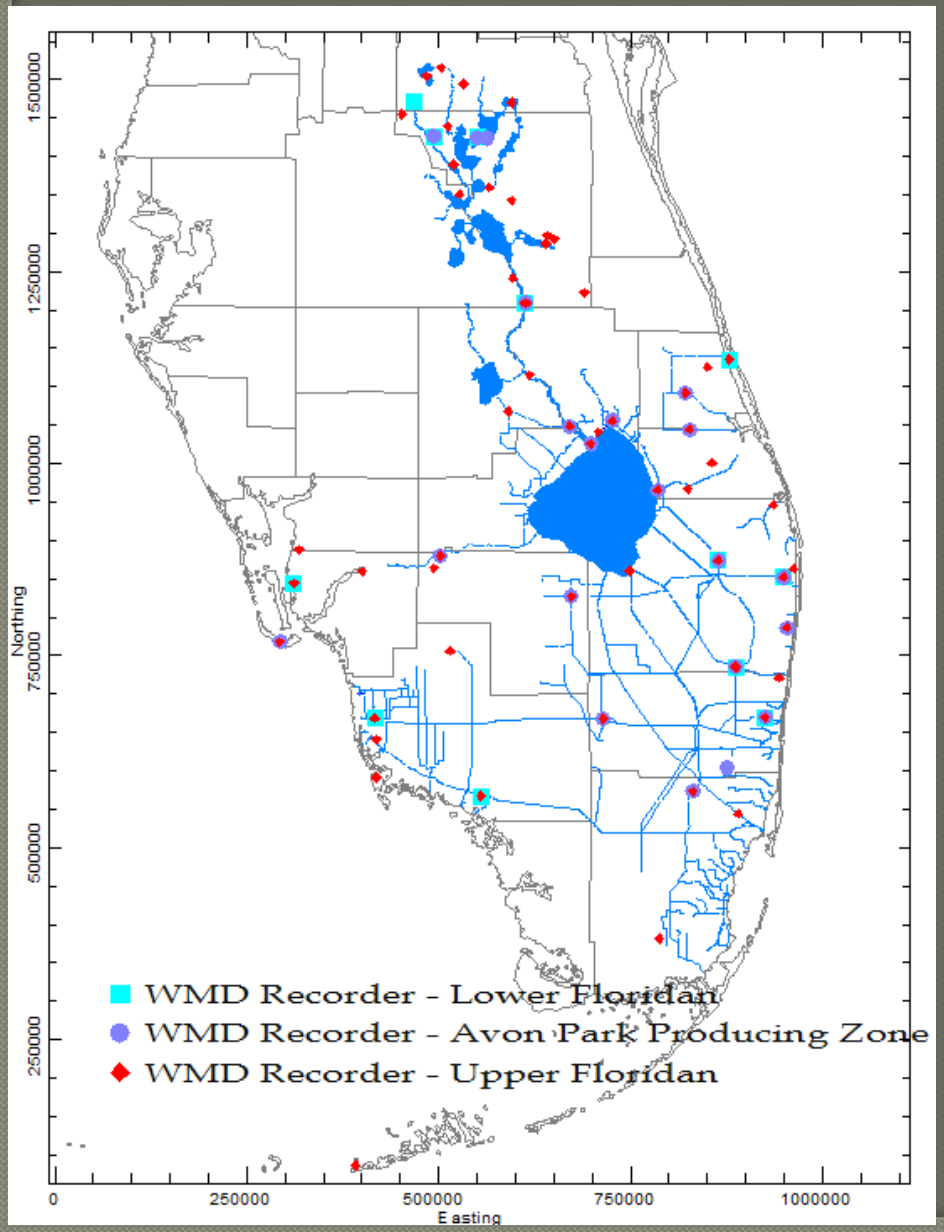
Pre-Development

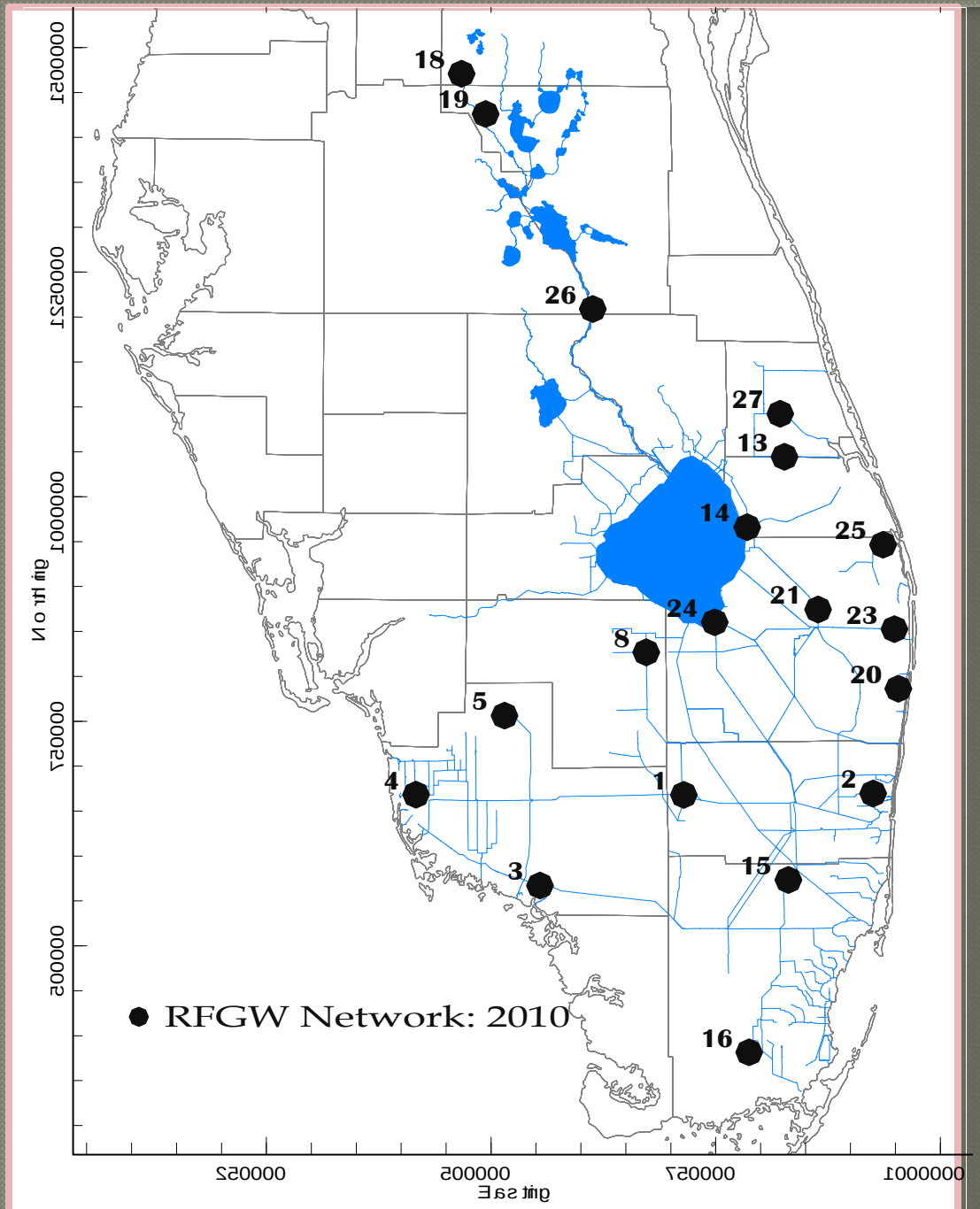


Current



Floridan Water-Level Monitor Network

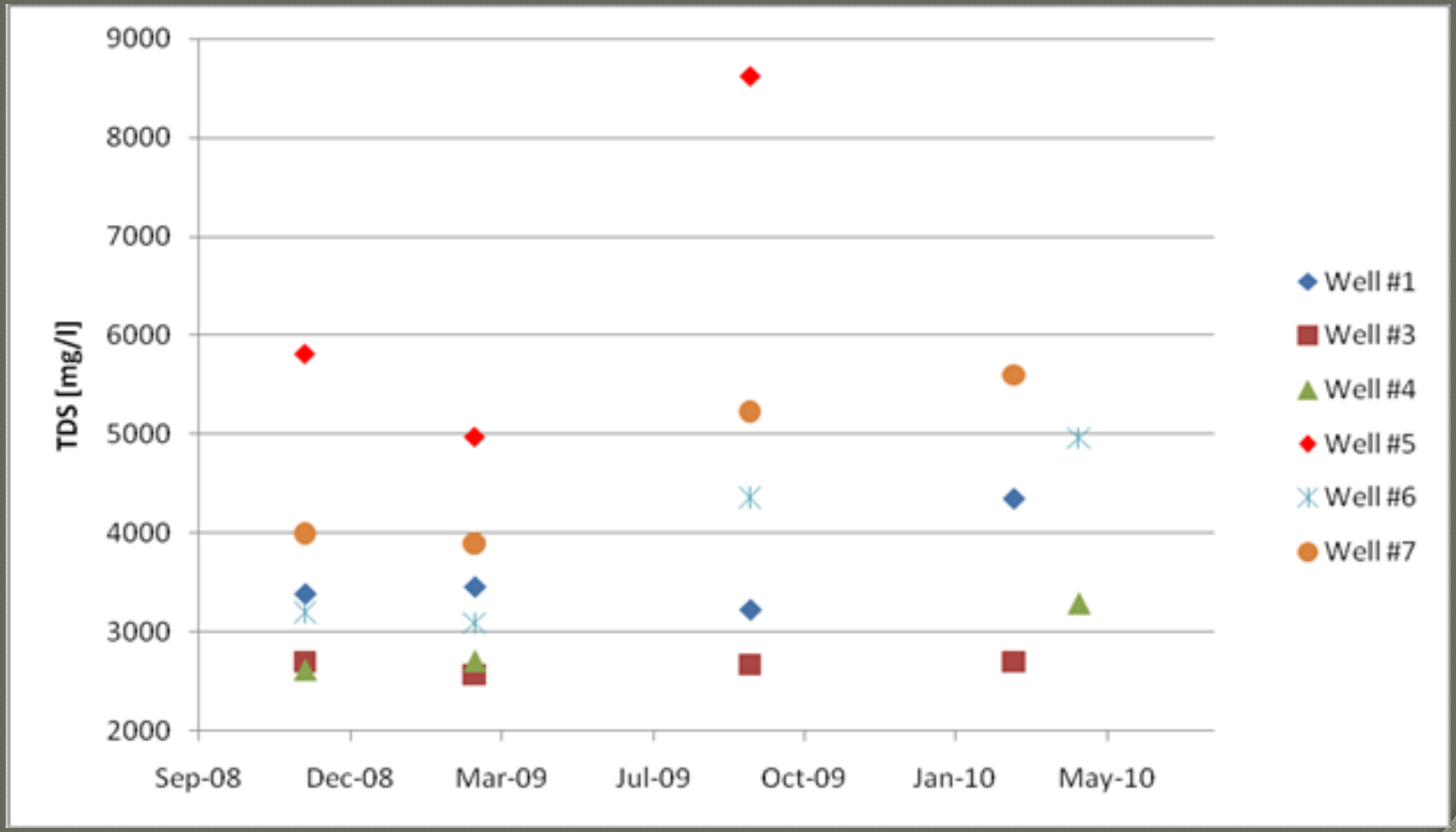




Floridan Water Quality Monitor Network

- Focus on brackish wells
- Annual sampling for specific conductance & field parameters
- Determine if there are regional changes in water quality

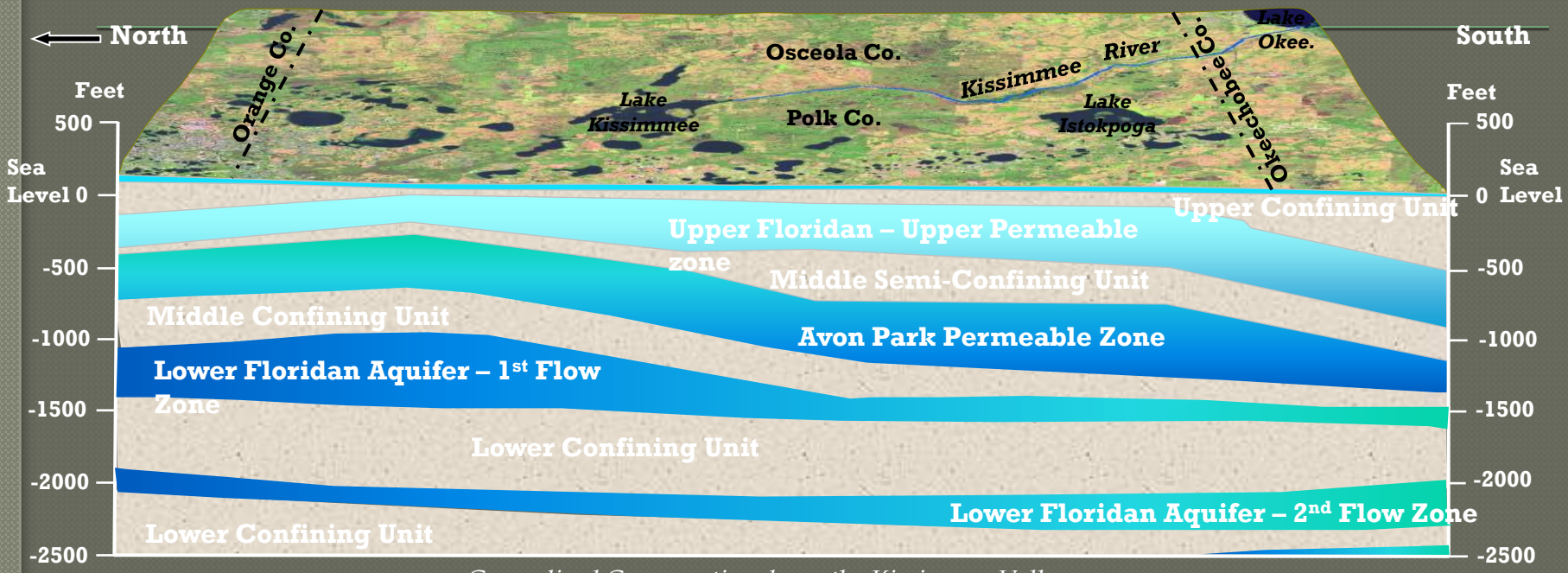
Floridan Wellfield Water Quality
PBCWUD Lake Region WTP



Key Points

- Top of Floridan Aquifer gets deeper from North to South
- Upper zones of Floridan Aquifer are fresh in Central Florida, but get salty from North to South and with greater depth
- Transmissivity (productivity) of FAS zones is variable
- Few wells in the Lower Floridan Aquifer, yet this is a good future Alternative Water Supply source
- Relatively stable water quality seasonally, but geographically variable
- Some pumping wells become saltier (upconing of more saline water from below or laterally along coast)

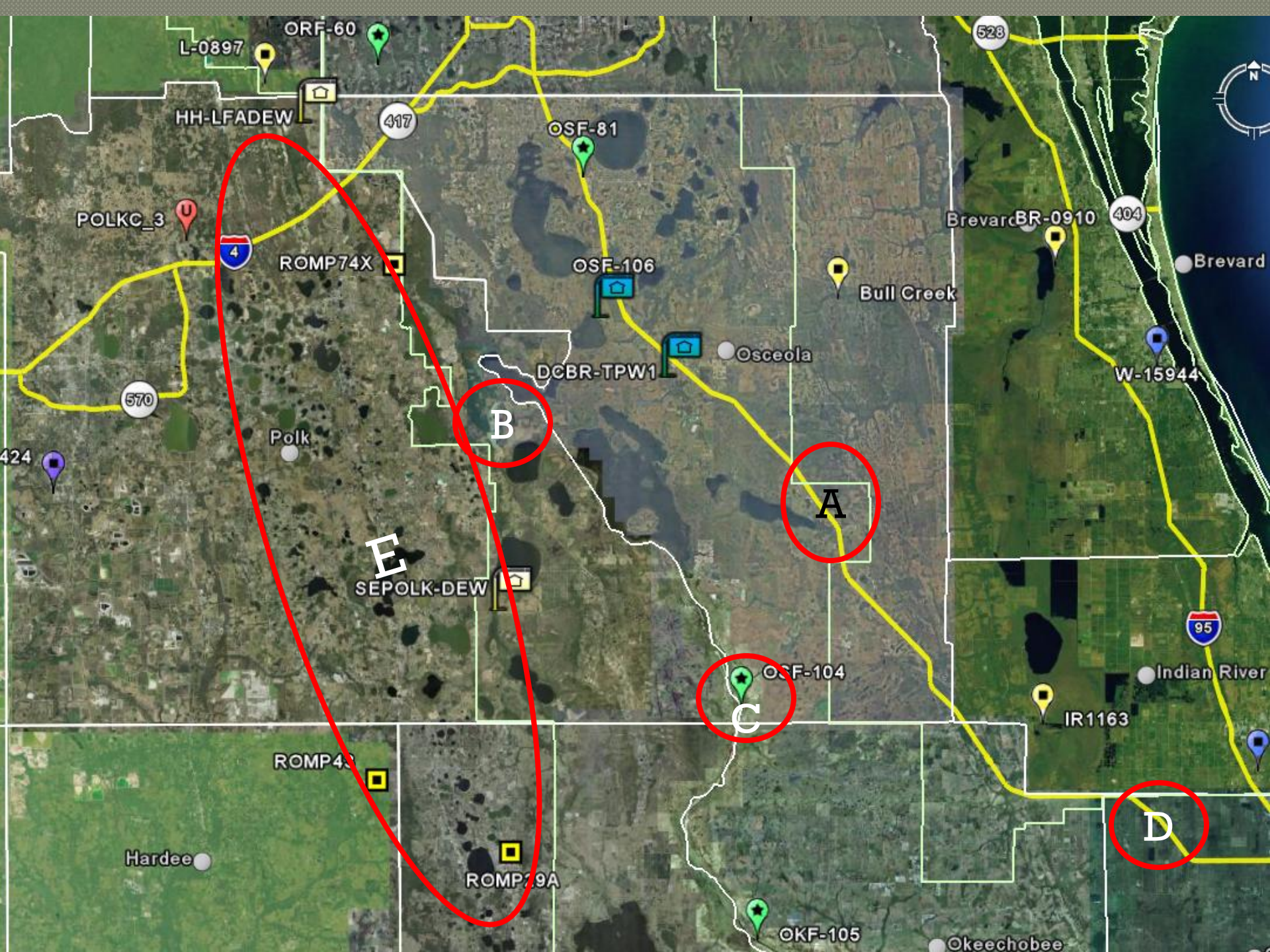
Lower Floridan Aquifer as an Alternative Water Supply Source



Generalized Cross-section down the Kissimmee Valley

Strategy: Install and test new LFA wells to determine:

- Degree of connection to overlying aquifers
- Evaluate multiple layers in LFA
- Range of productivity and water quality
- Spatial extent
- Sustainability


ORF-60
L-0897
HH-LFADEW
417
OSF-81
POLKC_3
4
ROMP74X
OSF-106
Bull Creek
Brevard
BR-0910
404
Brevard
Osceola
DCBR-TPW1
W-15944
570
Polk
B
A
E
SEPOLK-DEW
528
95
OSF-104
Indian River
IR1163
C
D
ROMP43
Hardee
ROMP79A
OKF-105
Okeechobee

5-Year Plan
Lower Floridan Aquifer, CFCA

Lower Floridan Aquifer Investigation, UKB						
Site	**FY2011**	**FY2012**	**FY2013**	**FY2014**	**FY2015**	**Subtotal**
A			$1,715,000	$897,950	$30,000	$2,642,950
B	$172,000	$1,024,000	$715,750	$15,000		$1,926,750
C	$222,000	$577,000	$10,000			$809,000
D	$974,000	$658,000	$65,000	$20,000	$20,000	$1,737,000
E	$400,000	$400,000	$30,000			$830,000
Subtotal	$1,768,000	$2,659,000	$2,535,750	$932,950	$50,000	$7,945,700
FTEs	1.8	2.2	2.2	2.0	1.0	9.2
FTEs ($)	$180,000	$220,000	$220,000	$200,000	$100,000	$920,000
Total	**$1,948,000**	**$2,879,000**	**$2,755,750**	**$1,132,950**	**$150,000**	**$8,865,700**

Install and test wells at five sites (Sites A, B, C, D, and E) in CFCA to evaluate multiple zones above and into the Lower Floridan Aquifer as an alternative water supply source

Conclusions

- Floridan Aquifer System (FAS) will be relied upon to a greater degree to meet future water demands in SFWMD
- Deeper zones within the FAS have less data but are the most likely to be relied upon to meet these future demands due to poorer water quality and lower hydraulic connection to stressed aquifers and natural systems
- Additional wells and long-term monitoring are necessary in these deeper zones of the FAS to provide data for evaluation of water supply potential and calibrate models to manage the resource
- Cooperative agreements and collaborative efforts with other districts, utilities, and agriculture are essential to leverage limited financial resources